## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 26, 2009 has been entered.

The amendment filed with the RCE submission of January 26, 2009 has been received and entered. With the entry of the amendment, claims 2, 5, 6, 8, 9, 11 and 12 have been canceled, and claims 1, 3, 4, 7 and 10 are pending for examination.

### *Claim Rejections - 35 USC § 112*

2. The rejection of claims 1, 3, 4, 7 and 10 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement is withdrawn due to the amendment of January 26, 2009 to remove the rejected material.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 3, 4, 7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al (US 5167992) in view of the admitted state of the prior art, McCormack et al (US 3443988), Miller (US 4668533) and WO 02/099162 A2 (hereinafter '162)

Lin teaches a method of electroless plating. Column 1, lines 5-10. A substrate is prepared that has an insulating body and a conductive pattern formed on the insulating body. Column 3, lines 45-55 and column 4, lines 30-50. The substrate is to be used for microelectronic interconnect substrates or circuit boards (that is, a wiring substrate). Column 3, lines 45-55. A catalytic metal serving as a catalyst of an electroless plating process is adhered onto the insulating body and the conductive pattern. Column 5, lines 35-60. An oxidizing agent, which can oxidize the catalytic metal and make the catalytic metal in an inactive state to the electroless plating is applied to the catalytic metal. Column 5, line 60 through column 6, line 20 and column 7, lines 25-35. It would be applied in a space portion S between the conductive pattern features (as it is shown being applied to the entire surface). Column 5, line 60 through column 6, line 20. Then a metal layer is selectively formed on the conductive pattern by electroless plating. Column 6, lines 20-30.

Claim 4: the adhering of the catalytic metal onto the insulating body and the conductive pattern includes coating an activating solution containing ions of the catalytic metal to deposit the catalytic metal by an oxidation reduction reaction. Column 5, lines 50-60 and column 7, lines 20-25.

Claim 7: the catalytic metal is palladium. Column 5, lines 45-60. The metal formed by electroless plating can be a nickel layer. Column 6, lines 20-40.

Claim 10: the oxidizing agent can be sulfuric acid ($H_2SO_4$). Column 7, lines 20-30.

Lin teaches all the features of these claims except that (1) the conductive pattern includes electrodes to be used with connection pads, (2) the space portion between the electrodes has a plurality of different values, (3) that the oxidizing agent is coated selectively so that the oxidizing agent is formed selectively only on all parts of the space portion which are smaller than 30 microns, out of the space portion between the electrodes, to prevent short circuits, (4) the ink jet printing of the oxidizing agent (claim 3).

The admitted state of the prior art teaches that when forming wiring substrates with conductive patterns, it is well known for the wiring patterns to include electrodes formed of copper which then are overplated to enhance reliability, and the electrodes form connections to the electronic parts. See paragraphs [0002] – [0008] of the specification. It is also well known for the pitch of the copper electrodes on the wiring substrate to be narrowed to 60 microns or less, and that short circuit problems occur when plating with these narrowed spaces present. See paragraphs [0002]-[0008] of the

specification. It is also well known for the space portions between the copper electrodes to vary over the substrate. See paragraph [0006] of the specification. It is also well known to desire to form a nickel layer selectively on the copper electrodes by electroless plating. See paragraphs [0002]—[0008] of the specification. This electroless plating provides plating without using solder resist. See paragraphs [0002]—[0008] of the specification.

McCormack teaches that when electroless plating a substrate, it is known to be desired to only coat certain areas of a substrate. Column 1, lines 10-20 and 30-45. McCormack teaches that to provide such selective coating, it is known to first treat the entire substrate (base) with a catalyst material, such as palladium to render the substrate senstitive to the reception of electroless plating. Column 5, lines 30-45. Then a "poison" material that deactivates the catalyst (neutralizes, lowers catalytic activity) is applied to limited selected areas of the based material, such as by printing or silk screen stenciling. Column 5, lines 30-45 and column 2, lines 15-35. Thereafter, the base is contacted with an electroless metal deposition solution to deposit electroless metal deposition solution to deposit electroless metal on the sensitized areas not coated with the "poison" containing material. Column 5, lines 30-45. The poisons can include sulfur, used in elemental or compound form. column 2, lines 25-35. The poisons can be dissolved in appropriate solvent, such as water, and applied. Column 3, lines 1-10 and 48-50.

Miller teaches ink jet printing as a well known printing method to apply materials for electroless plating in a selective form, such as sensitizers and activators. Column 2, lines 40-50, column 3, lines 45-60 and column 4, lines 15-30. The substrate can be an active integrated circuit. Column 3, lines 25-35.

‘162 teaches performing electroless plating (page 1), where the substrate is provided with a pre-determined pattern of catalytic material using a pattern transfer mechanism such as ink-jet printing (page 3). '162 clarifies that when using ink-jet printing, minimum feature sizes on the order of 20 microns are possible. Page 3.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to (1) (2) modify Lin to provide that the conductive pattern includes electrodes spaced different distances apart and that these electrodes can be less than 60 microns apart as suggested by the admitted state of the prior art in order to provide a desirable circuit and microelectronic pattern because Lin teaches forming conductive patterns on insulating substrates for circuit and microelectronic usage, and the admitted state of the prior art teaches that conductive patterns on wiring substrates for such purposes conventionally have copper electrodes spaced different distances apart and that the electrodes can be less than 60 microns apart. It further would have been obvious to perform routine experimentation to optimize the distance apart to less than 30 microns apart in at least some cases as the admitted state of the prior art provides that less than 60 microns apart is conventional, and 30 microns is included in the range of less than 60 microns. As to the electrodes being on which connection pads

of an electronic part are connected, the admitted state of the prior art teaches that the electrodes are used to provide connection to the electronic parts, and thus would connect with connecting devices or “pads” on the electronic parts. (3) It further would have been obvious to modify Lin in view of the admitted state of the prior art to apply the oxidizing agent selectively to the non electrode “space” portion, including all the parts of the space portion of less than 30 microns apart, and only those spaces, as suggested by McCormack, in order to prevent plating in the unwanted areas between the electrodes, because Lin teaches that it is desired to deactivate catalytic coating on the dielectric surface (i.e. the spaces between conductors) to prevent plating and resulting short circuits and the admitted state of the art teaches that a particular problem which such plating occurs in narrow spaces, which are less than 60 microns apart (which would be inclusive of less than 30 microns apart); and McCormack teaches that a deactivating poison material can desirably be applied specifically to areas where plating is not desired by a selective coating process such as printing. By printing selectively in the areas desired not to have any plating, the amount of material used can beneficially be reduced. As to providing the material on all spaces less than 30 microns apart and only those spaces, as noted above the admitted state of the prior art suggests problems in spaces less than 60 microns apart, which would provide a range of just below 60 microns and below, and less than 30 microns would provide a range within that just below 60 microns and below range, and In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists.

In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Therefore, when optimizing the areas on which oxidizing agent is to be applied, it would have been obvious to select the range of less than 30 microns. Applicant has provided no showing of unexpected results specifically for the range of less than 30 microns, especially as one of ordinary skill in the art would expect the problem of short circuits to grow as spaces become closer together, as the problem is one that occurs because of narrowness between spaces. (4) It further would have been obvious to modify Lin in view of the admitted state of the prior art and McCormack to provide this oxidizing agent in the narrow spaces of less than 30 microns apart by a process known to allow application of patterns with features of less than 30 microns such as ink-jet printing as suggested by Miller and '162 with an expectation of desirable printing results, as McCormack teaches that selective application of deactivating material can be by printing, and Miller teaches a well known printing method for selective application of materials for electroless plating is by ink jet printing, with '162 teaching that features for materials applied in an electroless process by ink-jet printing can be less than 30 microns, such as on the order of 20 microns.

5. Claims 1, 3, 4 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zeller (US 4770899) in view of the admitted state of the prior art, McCormack et al (US 3443988), Miller (US 4668533) and WO 02/099162 A2 (hereinafter '162).

Zeller teaches a method of electroless plating. Column 1, line 65 through column 2, line 12. A substrate is prepared that has an insulating body and a conductive pattern formed on the insulating body. Column 2, lines 20-50. The substrate is to be used for interconnect integrated circuits (i.e. wiring substrate). Column 1, lines 5-15. A catalytic metal serving as a catalyst of an electroless plating process is adhered onto the insulating body and the conductive pattern. Column 2, lines 50-68. An oxidizing agent, which can oxidize the catalytic metal and make the catalytic metal in an inactive state to the electroless plating is applied to the catalytic metal. Column 3, lines 1-12 (sodium hydroxide is a known oxidizing agent, and it deactivates the catalytic metal). It would be applied in a space portion S between the conductive pattern features (as it is shown being applied to the entire surface). Column 3, lines 1-12 and figure 3. It is desired to prevent plating on the space portion to prevent shorts. Column 2, lines 8-11 and column 1, lines 55-60. Then a metal layer is selectively formed on the conductive pattern by electroless plating. Column 3, lines 10-25 and figure 4.

Claim 4: the adhering of the catalytic metal onto the insulating body and the conductive pattern includes coating an activating solution containing ions of the catalytic metal to deposit the catalytic metal by an oxidation reduction reaction. Column 2, lines 45-65 (note the palladium chloride and hydrochloric acid used, which will have the claimed reaction).

Claim 7: the catalytic metal is palladium. Column 2, lines 45-65. The metal formed by electroless plating can be a nickel layer. Column 3, line 55 through column 4, line 5.

Zeller teaches all the features of these claims except that (1) the conductive pattern includes electrodes to be used with connection pads, (2) the space portion between the electrodes has a plurality of different values, (3) that the oxidizing agent is coated selectively so that the oxidizing agent is formed selectively only on all parts of the space portion which are smaller than 30 microns, out of the space portion between the electrodes, to prevent short circuits, (4) the ink jet printing of the oxidizing agent (claim 3).

The admitted state of the prior art teaches that when forming wiring substrates with conductive patterns, it is well known for the wiring patterns to include electrodes formed of copper which then are overplated to enhance reliability, and the electrodes form connections to the electronic parts. See paragraphs [0002] – [0008] of the specification. It is also well known for the pitch of the copper electrodes on the wiring substrate to be narrowed to 60 microns or less, and that short circuit problems occur when plating, with such narrowed spaces present. See paragraphs [0002] – 0008] of the specification. It is also well known for the space portions between the copper electrodes to vary over the substrate. See paragraph [0006] of the specification. It is also well known to desire to form a nickel layer selectively on the copper electrodes by electroless plating. See paragraphs [0002] – [0008] of the specification. This electroless plating

provides plating without using solder resist. See paragraphs [0002] – [0008] of the specification.

McCormack teaches that when electroless plating a substrate, it is known to be desired to only coat certain areas of a substrate. Column 1, lines 10-20 and 30-45. McCormack teaches that to provide such selective coating, it is known to first treat the entire substrate (base) with a catalyst material, such as palladium to render the substrate senstitive to the reception of electroless plating. Column 5, lines 30-45. Then a "poison" material that deactivates the catalyst (neutralizes, lowers catalytic activity) is applied to limited selected areas of the based material, such as by printing or silk screen stenciling. Column 5, lines 30-45 and column 2, lines 15-35. Thereafter, the base is contacted with an electroless metal deposition solution to deposit electroless metal deposition solution to deposit electroless metal on the sensitized areas not coated with the "poison" containing material. Column 5, lines 30-45. The poisons can include sulfur, used in elemental or compound form. Column 2, lines 25-35. The poisons can be dissolved in appropriate solvent, such as water, and applied. Column 3, lines 1-10 and 48-50.

Miller teaches ink jet printing as a well known printing method to apply materials for electroless plating in a selective form, such as sensitizers and activators. Column 2, lines 40-50, column 3, lines 45-60 and column 4, lines 15-30. The substrate can be an active integrated circuit. Column 3, lines 25-35.

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to (1) (2) modify Zeller to provide that the conductive pattern includes electrodes spaced different distances apart and that these electrodes can be less than 60 microns apart as suggested by the admitted state of the prior art in order to provide a desirable circuit and microelectronic pattern because Zeller teaches forming conductive patterns on insulating substrates for integrated circuits, and the admitted state of the prior art teaches that conductive patterns on wiring substrates for such purposes conventionally have copper electrodes spaced different distances apart and that the electrodes can be less than 60 microns apart. It further would have been obvious to perform routine experimentation to optimize the distance apart to less than 30 microns apart in at least some cases as the admitted state of the prior art provides that less than 60 microns apart is conventional, and 30 microns is included in the range of less than 60 microns. As to the electrodes being on which connection pads of an electronic part are connected, the admitted state of the prior art teaches that the electrodes are used to provide connection to the electronic parts, and thus would connect with connecting devices or "pads" on the electronic parts. (3) It further would have been obvious to modify Zeller in view of the admitted state of the prior art to

apply the oxidizing agent selectively to the non electrode "space" portion, including all the parts of the space portion of less than 30 microns apart, and only those spaces, as suggested by McCormack, in order to prevent plating in the unwanted areas between the electrodes, because Zeller teaches that it is desired to deactivate catalytic coating on the dielectric surface (i.e. the spaces between conductors) to prevent plating and resulting short circuits and the admitted state of the art teaches that a particular problem which such plating occurs in narrow spaces, which are less than 60 microns apart (which would be inclusive of less than 30 microns apart); and McCormack teaches that a deactivating poison material can desirably be applied specifically to areas where plating is not desired by a selective coating process such as printing. By printing selectively in the areas desired not to have any plating, the amount of material used can beneficially be reduced. As to providing the material on all spaces less than 30 microns apart and only those spaces, as noted above the admitted state of the prior art suggests problems in spaces less than 60 microns apart, which would provide a range of just below 60 microns and below, and less than 30 microns would provide a range within that just below 60 microns and below range, and In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Therefore, when optimizing the areas on which oxidizing agent is to be applied, it would have been obvious to select the range of less than 30 microns. Applicant has provided no showing of unexpected results specifically for the range of less than 30 microns,

especially as one of ordinary skill in the art would expect the problem of short circuits to grow as spaces become closer together, as the problem is one that occurs because of narrowness between spaces. (4) It further would have been obvious to modify Zeller in view of the admitted state of the prior art and McCormack to provide this oxidizing agent in the narrow spaces of less than 30 microns apart by a process known to allow application of patterns with features of less than 30 microns such as ink-jet printing as suggested by Miller and '162 with an expectation of desirable printing results, as McCormack teaches that selective application of deactivating material can be by printing, and Miller teaches a well known printing method for selective application of materials for electroless plating is by ink jet printing, with '162 teaching that features for materials applied in an electroless process by ink-jet printing can be less than 30 microns, such as on the order of 20 microns.

6. Sugama (US 4927462) notes that sodium hydroxide is a known oxidation agent. Column 3, lines 20-35.

*Response to Arguments*

7. Applicant's arguments with respect to claims 1, 3, 4, 7 and 10 have been considered but are moot in view of the new ground(s) of rejection.

The rejection has been clarified using Miller and new reference WO 02/099162 to clarify that provision of the oxidizing agent by a printing method such as ink-jet

printing would be expected to desirably provide and be capable of patterning in spaces smaller than 30 microns.

As to the selection of spaces of less than 30 microns and only those spaces, as discussed in the rejection above, the admitted state of the prior art suggests problems in spaces less than 60 microns apart, which would provide a range of just below 60 microns and below, and less than 30 microns would provide a range within that just below 60 microns and below range, and In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Therefore, when optimizing the areas on which oxidizing agent is to be applied, it would have been obvious to select the range of less than 30 microns. Applicant has provided no showing of unexpected results specifically for the range of less than 30 microns, especially as one of ordinary skill in the art would expect the problem of short circuits to grow as spaces become closer together, as the problem is one that occurs because of narrowness between spaces.

Furthermore, applicant provides in the arguments at page 5 of the response that the capability of applying the oxidizing coating into the region of less than 30 microns has not been provided by the teachings of the prior art and that coating spaces less than 30 microns is more difficult than coating larger areas up to 60 microns. However, the Examiner has noted the capability of ink-jet printing features less than 30 microns as discussed above. Furthermore, the Examiner does not note any indication in the prior

art (referred to by applicant) that printing of features less than 30 microns is harder than less than 60 microns (i.e. 30 to almost 60 microns). As well, the Examiner notes no indication in applicant's specification that special, unusual or novel features must be provided by the ink jet apparatus to print features less than 30 microns; which would apparently be needed if it was previously unknown to have the ability to ink jet print less than 30 micron features.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Katherine A. Bareford/
Primary Examiner, Art Unit 1792